Ch. 2 & 3 Newton’s 1st Law (Inertia) & Linear Motion

Aristotle-

* Heavier objects fall faster
* Geocentric universe
* Heavens made of quintessence- a perfect unchanging substance (did not follow normal laws)
* Motion –object not in its natural env. Will “seek” to get there {Fire rises, water falls} Did not believe in a vacuum;
  + NATURAL- up/down or circular
  + VIOLENT- imposed by external force (push or pull)

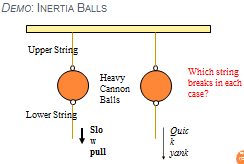
Copernicus

* Heliocentric (Hakeem’s razor) simplest explanation for motion of planets (moving earth)
* 1st published the day he died.

Galileo

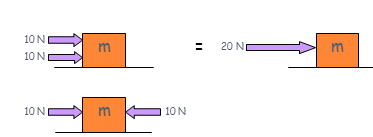
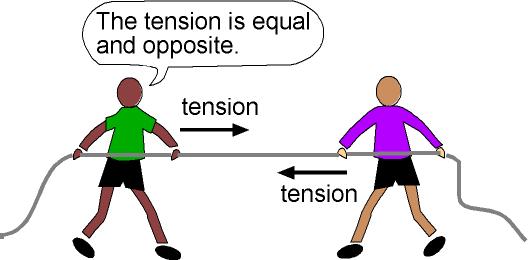
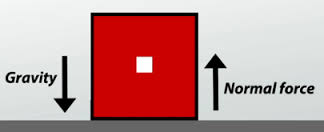
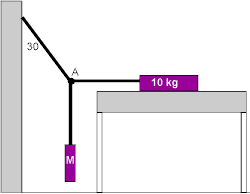
* + Denied his ideas at trial but sent material to be published in Holland
  + Believed Copernican Theory of solar system
  + Used telescopes- Saw mtns on our moon & on Jupiter; went blind looking toward sun?
  + Disproved Aristotle’s ideas about Falling bodies (used inclined planes to slow motion)
  + Believed in resistance/friction vs. absence of resistance

Newton

* Universal law of gravity (here & in space)
* Found solutions to problems not by sudden insight, but by continually thinking long and hard until he worked them out
* 1st Law- Inertia- objects to resist changes in position unless acted on by outside forces
  + Force- push or pull caused by Gravitational electrical, magnetic, muscles

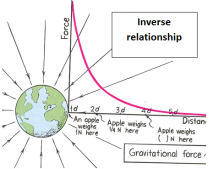
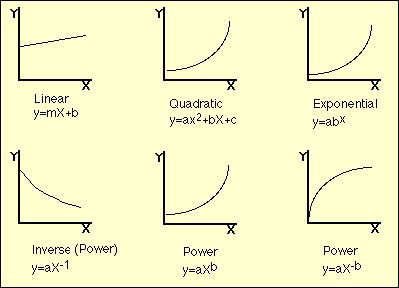
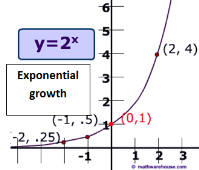
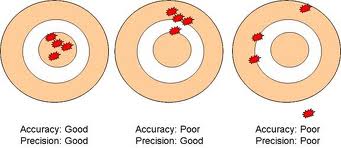
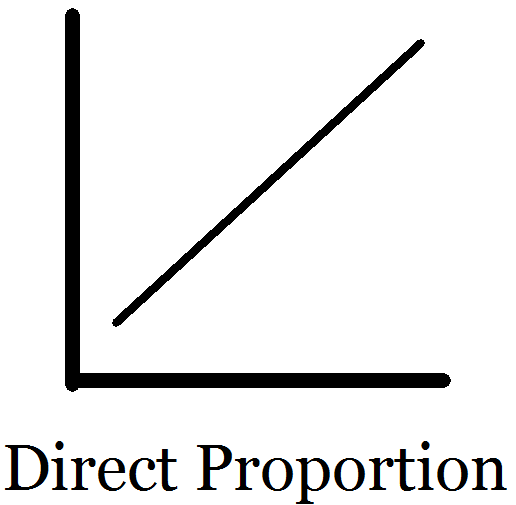
Scalar quantities- number only

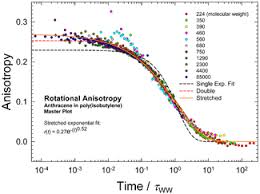
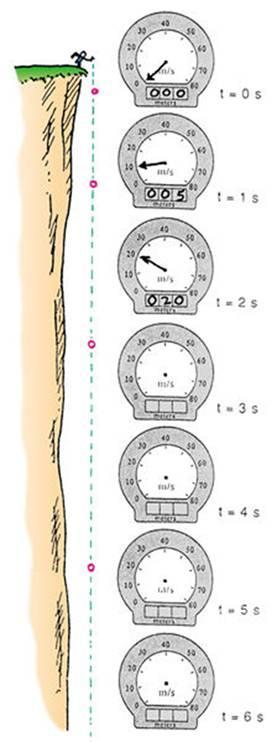
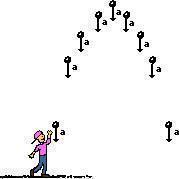
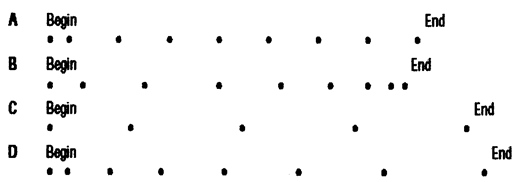
Vector quantities- number and direction- can be used with many units



Forces -Net forces

* Equilibrium Rule- **ƩF = 0**: Equal and opposite forces which cancel out- create **no change in motion**
  + Forms **Balanced** Forces
* Constant speed is also mechanical equilibrium
* Tension is stretching force; Gravity is force pulling down/ normal is supporting force pushing upward
* Up +, down -, vector direction
* Force measured in newton’s (pounds)
* Consider; Reason belief that Earth did not move: If bird flies upward and the earth was moving, he could not get back to the tree. Now know, everything including atm. moves

**Linear Motion Ch. 3**

1. Accuracy/precision
2. Making graphs
   1. Don’t connect dots
   2. ****Draw smooth curve with approximately same number of points above and below the line.
3. Motion is relative
   1. Position-time graph- (+ is up, - is down) Se
   2. Reference Point-  the point to which other things are compared or referred.
   3. Frame of Reference- A point of view
   4. Position- a point in relation to a reference origen. Needs distance & direction
   5. Motion diagram- time is always positive.
4. **Reference & Position**
   1. Distance = avg speed X time
   2. Distance= total distance traveled
   3. Displacement- a [vector quantity](http://www.physicsclassroom.com/Class/1DKin/U1L1b.cfm) that refers to "how far out of place an object is"; it is the object's overall change in position.
5. **Speed** = distance/time (m/s)
   1. Instantaneous speed- speedometer
      1. ( instantaneous speed = acceleration X time)
   2. Average speed- over a time period- don’t know about stops/starts
   3. Constant speed-cruise control
6. **Velocity** = speed and direction (use same formula as speed, but include direction)
   1. Constant speed = steady speed (m/s + direction)
   2. Constant velocity -Both constant speed+ in same direction
   3. **The symbol *v*0 [v nought] is called the initial velocity. It is often thought of as the "first velocity"**
7. **Acceleration** = changing velocity (speed up (+)/slow down (-), change direction)
   1. **Crash safety?**
   2. Acceleration = ∆ velocity / time interval or **a = vf-vi/t; (m/s2)**
   3. **Acceleration of gravity = g = 9.8 m/s2 or 10 m/s2; depends on mass (moon 1/6)**
      1. **g is acting, even if at the top of a parabola with 0 velocity**
8. **Free Fall**
   1. Velocity acquired in **free fall**, from rest; **v = gt**
   2. **Check to see if beginning (instantaneous speed ) = 0**
9. **Terminal Velocity**
   1. When the air resistance balances the pull of gravity , terminal velocity is reached; no longer accelerating.
10. **Far- how far will something fall when given time?**
    1. Distance fallen in free fall, from rest; **d = ½ gt2**
11. **How fast?**
12. Motion can be described as **Motion Diagrams/ Pictures**